

59. (Amended once) The foam article according to claim 23, further comprising at least one layer comprising a polymer composition, said layer bonded to said polymer foam.

Remarks

Claims 1, 57, and 59 are amended. The amendment to claim 1 is supported on page 8, lines 17-23 of the specification and adds no new matter to the application. The Examiner suggested the amendments to claims 57 and 59. A marked-up version of the claims showing the changes made is concurrently filed with this response.

Election / Restriction

The Examiner placed a restriction requirement on the application based on the amendment filed on April 9, 2003. As stated in a telephone conversation with Jean Lown on May 5, 2003, Applicants elect with traverse the invention of Group I and Species (A). The following claims are pending: 1-26, 29-32, 34-36, 43, and 47-60. Of these claims, the following are withdrawn from consideration but not cancelled: 43, 47, 48, and 51-54.

Rejection under 35 U.S.C. § 112, second paragraph

The Examiner rejected claims 57-60 as being indefinite. In the interest of advancing prosecution of the application, Applicants have amended the claims to clarify that the polymer composition is in a layer. Applicants respectfully request removal of the rejections based on indefiniteness.

Rejection under 35 U.S.C. § 102(b) or §103(a) over U.S. Patent No. 5,476,712

The Examiner rejected claims 1-6, 9-12, 17, 19-32, 34-36, 49, 50, and 57-60 as anticipated by or, in the alternative, as obvious over U.S. Patent No. 5,476,712 (hereinafter "US '712") issued to Hartman et al. Applicants submit that the pending claims are not anticipated or obvious over US '712.

The core (i.e., polymer foam) disclosed in US '712 has a rough surface. The skin layer is required to provide an article (i.e., carrier) having a smooth surface. In contrast, claim 1 has been amended to clarify that a major surface of the polymer foam of the present invention is smooth

without being bonded to an additional layer. At least one of the major surfaces of the polymer foam itself is smooth to a Ra value less than about 75 micrometers.

The Examiner alleged that Figure 1 in US '712 illustrates that the surfaces of the foam are parallel to the flat or smooth surfaces of the skin layers and adhesive layers. Figure 1 in US '712 shows an article that includes a polymer foam bonded to an additional layer (skin layer and adhesive layer). The amendment to claim 1 clarifies that the polymer foam is smooth without being bonded to an additional layer. There is no teaching in US '712 supporting the position that the surface of the foam itself is smooth without being bonded to the skin layer. Claim 1 and the claims dependent therefrom are not anticipated by or obvious over US '712.

Applicants note that Figure 1 is only a representation of the invention disclosed in US '712. The drawings in a patent are not required to show all the features of the actual article but only those that are needed to understand the particular invention being claimed (see MPEP § 608.02). The claims of US '712 are not directed towards the smoothness or roughness of the foam. Further, MPEP § 2141.02 provides that the reference as a whole needs to be considered. US '712 repeatedly teaches that the surfaces of the foam itself are not smooth but must each be bonded to an additional layer (i.e., the skin layer) to form an article (i.e., carrier) having surfaces that are smooth. Thus, when considered as a whole, US '712 does not teach a foam having at least one major surface that is smooth without being bonded to an additional layer, as recited in claim 1 of the present invention.

Regarding independent claim 23, the Examiner alleged that "the process for expanding the microspheres in the instant claimed invention is essentially the same as Hartman's teaching, and the expansion of the microspheres inherently occurs as the pressure applied to the polymer is reduced, which is in the region near the opening of the die." Applicants respectfully disagree with the Examiner. There are fundamental differences between the process used by the Applicants and the process disclosed in US '712. These process differences result in polymeric foams having distinctly different characteristics. Thus, contrary to the allegation by the Examiner in the Office Action, the polymer foams of the present invention are not inherently disclosed in US '712.

US '712 teaches that substantially all of the expansion of the polymeric microspheres occurs just as the polymer begins to flow out of the opening of the die and the pressure is reduced. That is, the die used in US '712 is designed such that the pressure drops outside the die.

Consequently, the microspheres are not expanded until the molten material exits the die. That is, the microspheres undergo substantial expansion only outside the die where the pressure is reduced. The thickness of the resulting foam is greater than the dimensions of the die opening.

In contrast, the present invention provides a pressure drop within the die. This can be done, for example, by changing the volume of the die cavity or the size of the opening at the exit of the die. The expandable polymeric microspheres can expand before the polymer composition exits the die. Because the microspheres can be substantially expanded inside of the die, the resulting extruded foam can be produced to within tighter tolerances. That is, the dimensions of the extruded foam can more closely match the dimensions of the die opening through which the composition is extruded out of the die. Foams that are expanded internal to the die as in the present invention typically have a smooth surface, even in the absence of an additional layer such as the skin layer disclosed in US '712.

Expansion of the microspheres in the present invention can occur while the polymer composition is in a melted form inside the die. The temperature is fairly uniform across the thickness of the melted polymer composition inside of the die cavity (i.e., the temperature gradient across the thickness of the melted material is relatively small during expansion of the microspheres). Consequently, the microspheres are exposed to about the same temperature during expansion and the size distribution of the expanded microspheres can be fairly uniform across the thickness of the foam. Further, the expanded microspheres can have a fairly uniform spherical shape across the thickness of the foam, because the temperature during expansion is fairly uniform (i.e., the foam is not cooling while the microspheres are expanding; for example, see shapes of expanded microspheres shown in scanning electron micrographs Figures 12a to 12d).

Foams that are expanded external to the die as in US '712 do not have such a uniform size distribution of expanded microspheres across the thickness of the article. Expansion occurs as the carrier (i.e., core plus skin layer) is cooling. The microspheres toward the center of the core can expand more than the microspheres towards the outer surface of the core because of a temperature gradient across the thickness of the article (i.e., the core is warmer in the center than at the outer surfaces during expansion of the microspheres). Microspheres at a higher temperature can expand more than microspheres at a lower temperature. The US '712 foam does not have a uniform size distribution of the expanded polymeric microspheres from the major

surfaces to the center of the foam, as recited in claim 23 of the present invention. Further, the shape of the expanded microspheres in the US '712 foam will not be as uniform as with the foams of the present invention because the temperature during expansion is changing.

Because the process used to prepare the polymer foams of the present invention is different than the process disclosed in US '712, the uniform size distribution of microspheres and the standard deviation of the density of the polymer foams are not inherently disclosed in US '712 as alleged by the Examiner. Claim 23 and the claims dependent therefrom are not anticipated by US '712 or obvious over this reference. US '712 provides no teaching or suggestion to modify its process so as to expand the microspheres inside the die. To the contrary, US '712 teaches that "[i]f expansion of the blowing agent occurs earlier in the extrusion process, there is a tendency for the microspheres to blow out through the skin layers sometime resulting in a very rough outer layer surface. Excessive pre-blowing can result in an effective loss of the cellular structure." (See column 7, lines 22-28)

The Examiner in referring to claims 19, 49, and 40 also alleged that "substituting Hartman's polymer matrix with a suitable melt extrudable polymer blend of adhesive polymer and thermoplastic elastomer is either inherently disclosed or within the skill of the art, as evidenced by Hartman's express teaching that the core layer is formed from selected thermoplastic elastomers such as A-B-A triblock copolymer, which is inherently a pressure sensitive adhesive" (see page 7, second full paragraph of office action). Applicants respectfully disagree with the Examiner. Further, Applicants are confused by this statement by the Examiner because in the Office Action dated January 9, 2003, the Examiner stated that "Hartman lacks specific teaching of forming a foam article from a pressure sensitive adhesive or a heat activated adhesive." (See paper number 8, page 5, third paragraph) Applicants agree with this earlier statement by the Examiner.

Hartman is directed towards foams for flexographic printing. For flexographic printing, a foam substrate is used that is elastic and that allows printing plate to be repeatedly deformed during the printing process without causing a permanent change to the foam properties. A foam that is permanently deformed would provide printed media with varying and inconsistent ink coverage. Foams designed for flexographic printing are chosen to be resilient and to have a high elastic modulus. US '712 teaches a foam that is a thermoplastic elastomer.

The A-B-A triblock thermoplastic elastomer disclosed in US '712 is not a pressure sensitive adhesive. A tackifier would need to be added to the A-B-A triblock thermoplastic elastomer to form a pressure sensitive adhesive. The only teaching of a tackifier in US '712 is directed to the adhesive layer rather than the foam core. As shown in Figure 1 of US '712, the adhesive layer is separated from the foam core by the skin layer. Thus, US '712 does not teach or suggest that the foam itself is a pressure sensitive adhesive as recited in claims 19, 49, and 50 of the present invention.

There is no teaching or suggestion that a tackifier can be added to the A-B-A triblock and the reference provides no motivation for adding a tackifier. To the contrary, the reference teaches that the A-B-A triblock thermoplastic elastomer can be blended with a thermoplastic film-forming polymer to modify its properties. The resulting blend tends to be firmer and display a decreased compressibility compared to the thermoplastic elastomer alone. That is, the reference teaches the desirability of making the foam firmer and less compressible. This teaching is consistent with the main expressed purpose of the US '712 invention, namely flexographic printing applications, as discussed above (see column 2, lines 40-45 of US '712). Adding a tackifier to prepare a pressure sensitive adhesive would not make the foam firmer and more compressible; a pressure sensitive adhesive is a viscoelastic material. Thus, adding a tackifier to the A-B-A triblock copolymer would result in properties opposite to what is disclosed as desirable (i.e., the foam would become less elastic and less resilient).

A pressure sensitive adhesive would be a poor candidate for a foam used in flexographic printing applications. US '712 teaches an elastic, high modulus, resilient foam substrate for flexographic applications. Claims 19, 49, and 50 are directed to low modulus, highly dissipative pressure sensitive adhesives for permanent adhesive applications.

Applicants submit that all the claim limitations of independent claims 1 and 23 are not taught or suggested in US '712. Thus, these claims as well as the claims dependent therefrom are not anticipated or obvious over US '712. Applicants respectfully request withdrawal of the rejections based on US '712 for claims 1-6, 9-12, 17, 19-32, 34-36, 49, 50, and 57-60.

Rejection under 35 U.S.C. § 103(a) over U.S. Patent No. 5,476,712 in view of U.S. Patent No. 5,100,728

The Examiner rejected claims 7-8 and 18 as obvious over US '712 in view of U.S. Patent No. 5,100,728 (herein after "US '728") issued to Plamthottam et al. Applicants submit that the pending claims are not obvious over the combination of US '712 and US '728.

The Examiner seems to be of the opinion that Applicants continue to argue the references individually. Applicants respectfully disagree with the Examiner. The analysis included in the response filed on April 9, 2003 was directed towards determining which elements of the independent claim were not taught or suggested in the first reference (i.e., US '712) and then determining if these elements were taught or suggested in the second reference (i.e., US '728). Thus, the analysis involved the combination of references.

Applicants submit that the Examiner has not established a *prima facie* case of obviousness based on the combination of US '712 and US '728 as they relate to claim 1, the claim from which claims 7, 8, and 18 depend. MPEP § 2142 provides that three basic criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references (or references when combined) must teach or suggest all the claim limitations.

The Examiner seems to be citing US '728 for the proposition that the pressure sensitive adhesive disclosed in US '728 could be used in US '712. However, there is no motivation provided to replace the foam in US '712 with a pressure sensitive adhesive. As discussed above, US '712 teaches that its foam article is suitable for use in flexographic printing applications and, more particularly, that the A-B-A triblock thermoplastic elastomer can be blended with a thermoplastic film-forming polymer to modify its properties. The resulting blend tends to be firmer and display a decreased compressibility compared to the thermoplastic elastomer alone. That is, US '712 teaches the desirability of making the foam firmer and less compressible, which is desirable for flexographic printing applications. Modifying the foam composition such that it is a pressure sensitive adhesive would not make the foam firmer and more compressible; a pressure sensitive adhesive is a viscoelastic material. Thus, modifying the foam composition to be a pressure sensitive adhesive would result in properties opposite to what is disclosed as

desirable in US '712. The first criterion for a prima facie case of obviousness has not been established (i.e., there is no motivation to modify US '712 to provide a foam that is a pressure sensitive adhesive).

Even if the pressure sensitive adhesive composition of US '728 were used in the place of the A-B-A block copolymer in US '712, the resulting foam would not have a smooth surface without being bonded to an additional layer. The combination of references does not teach or suggest that a polymer foam itself has a Ra value less than 75 micrometers when it contains expanded expandable microspheres. The combination of references does not teach or suggest all the claim limitations of independent claim 1, the claim upon which claims 7-8 and 18 depend. The third criterion for a prima facie case of obviousness has not been established (i.e., not all the limitations of independent claim 1 are taught or suggested).

If the teachings of US '712 and US '728 were combined there is no reason to expect that the resulting polymer foam would be smooth by itself. US '712 repeatedly teaches that the foam itself is rough and a smooth article is prepared by bonding the foam to another layer. Replacing the A-B-A triblock polymer with another polymer would negate this need for another layer. The second criterion for a prima facie case of obviousness has not been established (i.e., there is no reason to believe that the foam itself would be smooth by using a pressure sensitive adhesive composition in place of the composition disclosed in US '712).

Applicants respectfully request withdrawal of the obviousness rejection based on the combination of US '712 and US '728.

Rejection under 35 U.S.C. § 103(a) over U.S. Patent No. 5,476,712 in view of U.S. Patent No. 4,415,615

The Examiner rejected claims 13-16 as obvious over US '712 in view of U.S. Patent No. 4,415,615 (hereinafter "US '615") issued to Esmay et al. Applicants submit that the pending claims are not obvious over the combination of US '712 and US '615.

The Examiner seems to be of the opinion that Applicants continue to argue the references individually. Applicants respectfully disagree with the Examiner. The analysis involved in the response of April 9, 2003 was directed towards determining which elements of the independent claim were not taught or suggested in the first references (i.e., US '712) and then determining if

these elements were taught or suggested in the second reference (i.e., US '615). Thus, the analysis involved the combination of references.

Claims 13-16 are dependent on claim 1. Applicants submit that the Examiner has not established a prima facie case of obviousness regarding claim 1. The bonding of the carrier of US '712 to additional structures as taught in US '615 would not alter the fact that the foam itself, without such additional structures, would not be smooth. The combination of references does not teach all the claim limitations of independent claim 1. There is no reason to believe that the addition of other layers would alter the smoothness of the foam itself.

Applicants respectfully request withdrawal of the rejections based on the combination of US '712 and US '615.

Rejection under 35 U.S.C. § 103(a) over U.S. Patent No. 5,476,712 in view of U.S. Patent No. 4,833,193

The Examiner rejected claims 55 and 56 as obvious over US '712 in view of U.S. Patent No. 4,833,193 (hereinafter "US '193") issued to Sieverding. Applicants submit that the pending claims are not obvious over this combination of references.

The Examiner alleged that "it would have been obvious to one of ordinary skill in the art to use Sieverding's triblock copolymer blend as the polymer matrix of Hartman's foam articles, motivated by the desire to obtain stretch releasable and reusable foam adhesive article." Applicants submit that Sieverding does not disclose adhesive articles that are capable of stretch activated release as the phrase is used in the present application.

The present application discusses adhesives that are capable of stretch activated release in the example section of the application. More specifically, the adhesives are discussed in examples 50-52, which refer to, and incorporate by reference, U.S. Patent No. 5,507,464 issued to Bries et al. (hereinafter "US '464"). US '464 provides that an adhesive tape capable of stretch activated release is an easily removable, pressure sensitive adhesive that includes a highly extensible, substantially non-recovering backing. The tape is capable of being firmly bonded to a substrate and removed therefrom by being stretched at an angle of no greater than about 35 degrees from the surface of the substrate.

As discussed above, US '712 teaches away from modifying the composition of the foam to include a pressure sensitive adhesive. US '712 teaches the desirability of making the

thermoplastic elastomer firmer and less compressible by the addition of thermoplastic film forming materials. However the addition of a viscoelastic pressure sensitive adhesive like those discussed in US '193 or US '464 would make the material less firm and more compressible. Thus, there would be no motivation to substitute a pressure sensitive adhesive of any construct for the polymer compositions in US '712.

The Examiner has not established a prima facie case of obviousness. Applicants respectfully request withdrawal of the rejection based on the combination of US '712 and US '193.

Premature Final Rejection

Applicant respectfully requests withdrawal of the finality of the Office Action as being premature. Because each and every element recited in claims 23-32 and 34-36 cannot be found in the US '712 patent, as discussed above, these claims are not anticipated by this patent. Further, as discussed above, these claims are not obvious over the US '712 patent. Consequently, the above 35 U.S.C. §102 or, in the alternative, 35 U.S.C. §103 rejection should be withdrawn, and because these claims 23-32 and 34-36 were improperly rejected under 35 U.S.C. §102 or 35 U.S.C. §103, Applicant submits that the finality of the Office Action dated May 9, 2003 was premature. Accordingly, Applicant respectfully requests withdrawal of the finality of the present Office Action. See MPEP §§706.07(a), (c) and (d).

The Examiner is requested to call the representative of the Applicants if any further clarification of the application and the claims is needed. Applicants submit that the pending claims are in condition for allowance. A Notice of Allowance is earnestly solicited.

Respectfully submitted,

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Date

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Marked-up Version Showing Changes Made to Application**In the claims:**

1. (Amended twice) A foam article comprising a polymer foam, said polymer foam having at least one of its major surfaces smooth to an Ra value less than about 75 micrometers, as measured by laser triangulation profilometry, said polymer foam being smooth without being bonded to an additional layer,

said polymer foam comprising a homogeneous distribution of a plurality of thermoplastic expandable polymeric microspheres,
wherein said plurality of expandable polymeric microspheres are at least partially expanded.

57. (Amended once) The foam article according to claim 1, further comprising at least one layer comprising a polymer composition, said layer bonded to said polymer foam.

59. (Amended once) The foam article according to claim 23, further comprising at least one layer comprising a polymer composition, said layer bonded to said polymer foam.